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Editorial.—In the Torrey Bulletin for June the editors continue their valuable list of the state and local floras of the United States. This is the third paper and is devoted to the south-eastern states, embracing Virginia, West Virginia, North Carolina, South Carolina, Georgia and Florida. Georgia seems to have been most poorly provided for, but a single local list having been made in the whole state.

Prof. A. B. Seymour, in the last Gazette, was made responsible for a rather meaningless note. His note upon "Early Fungi" bore the date of March 5 in the manuscript, but no date appeared in print, thus making it lose all its force. We would suggest that our readers date the note referred to, that it may not be lost sight of.

Mr. Chas. E. Smith, of Philadelphia, writes reporting a new station for *Corema Conradii*. He says: "I learned that *Corema Conradii* grew on Shawangunk Mountain, Ulster Co., N. Y., and as the plant has disappeared from two of the four localities formerly known (New Jersey and Long Island) I went there and got it. In the struggle for existence it appears to be getting the worst of it, and is dying out. On the second of May I found it in full bloom.

The Index to the genus *Carex* omits *C. Porteri*, Olney, found by Prof. Porter in Maine; *C. glaucodea*, Tuck., found in New Jersey; and gives "*C. Fraseriana*, Sims, no synonym." Gray writes it *C. Fraseriana*, Sims; Chapman *C. Fraseri*, Sims; Boott in his *Carices* writes *C. Fraseri*, Andrews, syn. *C. Fraseriana*, Sims, and adds a note giving names and dates of publication to justify the name *Fraseri* and Andrews as the authority. For these corrections we are indebted to Mr. Chas. E. Smith.

Mr. Joseph Jackson, Jr., of Millbury, Mass., is contributing to the *Worcester Daily Spy* some very interesting notes on the flora of that neighborhood. The subject is treated in a popular way which makes it interesting to the unscientific reader. The articles really furnish lists of the first appearance of the plants of that region, accompanied by appropriate remarks. As soon as 50 species have been enumerated they are published, thus making at the close of the season quite a complete catalogue.

Prof. V. Cesati, Director of the Botanic Garden at Naples, has offered for sale his large collection of plants. It consists of about 49,000 species, 32,000 being phanerogams, the whole containing over 350,000 specimens. The phanerogams are classified

according to DeCandolle's system, and are represented in many instances by original specimens. The collection is mounted on white paper and arranged in volumes. Prof. Cesati also offers for sale the autographs of 2,500 botanists. Persons desiring to obtain these collections, which contain plants from all over the world, should address Prof. Cesati before the end of August.

H. BAILLON has just published in Paris his *Monographie des Composees*. In Bentham and Hooker's *Genera Plantarum* this great order contains 780 genera, although the work of reduction was so rigidly performed that some genera were afterwards reinstated. Baillon has reduced the number of genera to 403, and in the sense that generic consolidation is a better fault than the opposite extreme this is commendable. Dr. Gray, for whose opinion in such matters we always look, says that even yet Baillon "keeps up several genera which we find it impossible to maintain; and there are others which should have been suppressed upon his principles, though not upon ours."

HUGO DEVRIES claims to have found the function of resinous matters in plants. That they were excrementitious has long since been given up, for their withdrawal from the plant proves to be an injury rather than a benefit. Hence they must be of some use to the plant, for in these days we do not believe so much that things were made for us as that we find in them and use what was made for themselves. DeVries thinks that in resin-producing plants the resinous juice is stored in the tree as a balm for wounds. Being stored up under tension it is immediately poured out over a wounded surface. No better dressing could be found than this rapidly oxidizing liquid, which excludes air and moisture and germs which induce decay.

THE UNIVERSITY of MINNESOTA will open a summer school during the coming season, beginning July 5th, to continue four weeks. The course in Botany will be conducted by Prof. J. C. Arthur, whose name and reputation are well known to readers of the GAZETTE. Laboratory work will be a prominent feature, and the subjects presented will be Morphology of the Vegetable Cell; Special Structure of Plants, considered by Classes; Vegetable Histology and Physiology; Bibliography and History of Botany. A personal acquaintance with Mr. Arthur in the laboratory gives the writer an opportunity to heartily recommend his work and methods to those desiring such instruction. He can be addressed at Charles City, Iowa, until July; after that at Minneapolis.

THE GARDENERS' MONTHLY for June is an unusually interesting number. Mr. Meehan is called upon to puncture a good deal of nonsense, and usually does so in a very sprightly way. In the number referred to, among other things, he noticed a curious paper read at the recent Forestry Convention held in Cincinnati, in which the writer suggested that the examination of cross-sections in a tree would show when the seasons in the past were dry seasons, and when wet ones—thin layers indicating the dry and broad ones the

wet. Mr. Meehan suggests that by taking sections at different places in the same log we would find the same layer bearing all kinds of testimony. The writer has heard classes gravely informed that the above was the fact, and also that the rings of growth found in fossil trees necessarily indicated seasons of cold and warmth. In the last instance a bright boy rather nonplussed the teacher by asking if there were no exogenous trees in the tropics.

PROF. F. C. PHILLIPS, of Western University, Penn., has been experimenting upon the effects produced upon plants by being grown in soil impregnated with certain metallic oxides. His conclusions are as follows:

1. That healthy plants, grown under favorable conditions, may absorb through their roots small quantities of lead, zinc, copper and arsenic.

2. That lead and zinc may enter the tissues in this way without causing any disturbance in the growth, nutrition and functions of the plant.

3. That the compounds of copper and arsenic exert a distinctly poisonous influence, tending, when present in larger quantity, to check the formation of roots, and either killing the plant or so far reducing its vitality as to interfere with nutrition and growth.

New Stations for Rare Plants.—1. *Botrychium matricariæfolium*, Al. Br. About June 10 of last summer, in company with Prof. Joseph Milliken of Columbus, O., I made an excursion for plants in the vicinity of this city. In a thicket on a northern slope, we found a specimen of this little fern. Going down on our hands and knees and making a thorough search, we finally counted *eighty-four* (84) specimens growing on an area of three or four square rods. This plant grows quite abundantly in eastern New York and in New England. But I have never before known it to be found west of the Alleghanies and south of Lake Superior. I have no doubt, though, that it grows on many a damp shady hillside with a northern exposure, in the states of Indiana, Kentucky and Ohio. It should be looked for during the month of June.

2. *Veratrum Woodii*, Robbins. This plant grows in the woods about Dayton, O. My attention was first called to it by finding it transplanted from the woods to a neighbor's door-yard. The plants were very few and far between, however, till I found quite a patch of it near Ludlow Falls, 17 miles above Dayton, on the banks of the Stillwater river. In one spot I counted fifteen (15) plants; the trouble was however that only four or five of them threw up flower stalks, so that I did not get many specimens.—A. P. MORGAN, *Cincinnati*.

The Exogenous Flora of Lincoln Co., Miss., From October to May. II.—In the brilliant procession of spring flowers come a few Asters and Golden Rods, heralds of the midsummer phalanx. Even the curious *Aster adnatus* is already in bud. Two things impress me as distinctive of the scenery and of the woodlands here.

There is very little of the freshness and the exuberance of vegetable growth which, farther north, characterize the time. There is, literally, no spring, no period of complete transition, no universal awakening into life. Plants doze through the mild winter and are quite undecided what to do, even when the equinox is past. The Star Anise and the Magnolias simultaneously bloom, unfold their new shoots and drop last year's leaves. The winter annuals are ripening their seeds and dying when, by the calendar, we should only expect young leaves and opening buds.

Another feature of the southern forests, noticeable even here, where the luxuriance of growth is much less than on the rich alluvial lands, is the great number of vines and showily blooming trees and shrubs. Over a muddy bayou hang the Cherry Laurel, the graceful *Euonymus*, the *Styrax* and the Farkle-berry with its delicate sprays of bloom, all interwoven with the wiry stems and profuse gold of the Yellow Jessamine, and hung with the tawny red trumpets of the Cross Vine. Or, later, beneath the Magnolias and Sweet Bays are thickets of gleaming *Hydrangea* and *Itea*, overrun with the scarlet Honeysuckles and the fragrant *Forsteronia*. In the herbaceous growth of the open barrens *Leguminosæ* are now greatly in preponderance, although I judge that in the advancing summer they will be displaced by the coarser *Compositæ*.

APRIL.

Magnolia grandiflora, L.
glauca, L.
acuminata, L.
Malva rotundifolia, L.
Modiola multifida, Mœnch.
Drosera brevifolia, Pursh.
Geranium Carolinanum, L.
Rhus copallina, L.
Toxicodendron, L.
var. quercifolia
var. radicans.
aromatica, Ait.
Vitis Labrusca, L.
vulpina, L.
Ampelopsis quinquefolia, Michx.
Euonymus Americana, L.
Polygala Boykinii, Nutt.
fastigiata, Nutt.
Sesbania macrocarpa, Muhl
Stylosanthes elatior, Sw.
Schrankia uncinata, Willd.
Psoralea melilotoides, Michx.
var. eglandulosa (?)
Decumaria barbara, L.
Specularia perfoliata, A. DC.
Ludoviciana, Torr.
Fedia radiata, Michx.
Maruta Cotula, DC.
Erigeron strigosum, Muhl.
Ilex opaca, Ait.
Dahoon, Walt
decidua, Walt.
Lobelia Nuttallii, R. & S.
Catalpa speciosa, Warder.
Pentstemon pubescens, Sol.
gracilis, Nutt.
Digitalis, Nutt.
Plantago major, L.
Virginica, L.
Pedicularis Canadensis, L.
Verbena Aubletia, L.
Scutellaria serrata, Andrews
parvula, Michx.
Dianthera humilis, Gray.
Ruellia ciliosa, Nees.
Physalis Pennsylvanica, L., var. lanceolata
angulata, L.
Capsicum annuus, L. (nat.)
Datura Tatula, L.
Spigelia Marylandica, L.
Asclepias variegata, L.
tuberosa, L.
Asclepiodora viridis, Gray.
Polygonum incarnatum, Ell
hydropiperoides, Michx.
acre, HBK.
aviculare, L.
Euphorbia corollata, L.
var. angustifolia
Celtis Mississippiensis, Bosc.
Pilea pumila, Gray.

MAY.

Cleome pungens, Willd.
Malva sylvestris, L.
Cocculus Carolinus, DC.
Hypericum Canadense, L., var. major, Drummondii, T. & G.
Polygala incarnata, L.
Erythrina herbacea, L.
Passiflora incarnata, L.
lutea, L.
Rhexia Mariana, L.
Hydrangea quercifolia, Bartram.
arborescens, L.
Hydrocotyle interrupta, Muhl.
Sanicula Canadensis, L.
Eryngium prostratum, Baldwin.
Discopleura capillacea, DC.
Thaspium barbinode, Nutt.
Sambucus Canadensis, L.
Lonicera sempervirens, Ait.
grata, Ait.
Cephalanthus occidentalis, L.
Galium hispidulum, Michx.
Helenium tenuifolium, Nutt.
Ceanothus Americana, L.
Desmodium paniculatum, DC.
Psoralea canescens, Michx
[Gr. Tephrosia Virginica, Pers.
spicata, T. & G.
hispidula, Pursh.
Crotalaria Purshii, DC.
Solidago radula, Nutt.
Aster patens, Ait.
surculosus, Michx.
Echinacea augustifolia, DC.
Rudbeckia hirta, L.
Coreopsis lanceolata, L.
Helianthus occidentalis, T. & G.
doronicoides, Lam.
Cirsium Virginianum, Michx.
Pyrrhopappus Carolinianus, DC.
Oxydendrum arboreum, DC.
Solanum nigrum, L.
Carolinense, L.
Forsteronia difformis, A. DC.
Saururus cernuus, Willd.
Phytolacca decandra, L.
Callicarpa Americana, L.

MARTHA B. FLINT, *Brookhaven, Miss.*

"**Beitraege zur Morphologie und Physiologie der Pilze,** von A. DEBARY und M. WORONIN. Fuenfte Reihe. BEITRAG zur Kentniss der Ustilagineen, mit vier Tafeln."—In this important contribution to Mycological literature we have an attempt to form a philosophical system of classification of the *Ustilagineæ* upon the peculiarities of spore growth and "sporidia" production. It is quite needless to say that it is based upon the quiet assumption that the time has come for giving life history more, and a single phase of life history less weight in our systems of classification. Of course beside the leading idea of the contribution many isolated facts of value find place in this clearly written and beautifully illustrated memoir. We can only give the more important in this brief *resume*.

Plate I represents *Tuburcinia Trientalis*, which in its conidial state covers the under side of the leaves of *Trientalis Europæa*, L. The specimen was taken early in June. Sections made through the young leaves of the host show an abundant ramification of the cross-partitioned hyphæ beneath the epidermis, and between and into the chlorophyll-bearing cells. These threads reach the air *either through a stoma, or sometimes directly between the epidermis cells*. Some of the escaping threads creep in a tortuous manner over the leaf surface; others are erect and terminated by a single inversely pear-shaped conidium. Sowing these conidia on a growing Trientalis leaf and after a short time removing the epidermis it will be seen that the conidial threads have reached the interior of the leaf *between the cells of the epidermis*.

Plate II gives the condition of affairs in late summer, when a transverse section through the stem shows spore masses in the

central, but more largely in the superficial parts of the preparation. The mode of formation of these spore masses is strikingly suggestive of other *Carposporeæ*. Essentially it consists in one or two end cells from the same or different threads becoming bladder-like [and contents dividing into spore masses?], whilst around these, delicate filaments spin themselves so quickly and closely that what transpires in the center can only be conjectured. This outer knot-like protecting case appears from the figures to be more or less completely absorbed or reduced by the growth and pressure of the spore masses.

Examining these affected Trientalis plants in the cold wet weather of autumn it will be discovered that the dark-brown spore masses show signs of growth. Placing these under a microscope and keeping them in a moist atmosphere one may see the individual spores sending out transparent thickish promycelia as growing tubes. Each of these tubes terminates in a basidial cell, which in turn produces 4 to 8 "primary sporidia." The use of the term sporidia in this sense is according to Tulasne. (The same word it is to be observed is used by our American botanists more frequently for the spore-like bodies found in asci of the Ascomycetous fungi.)

See plate III, figures 1-12. Between pairs of these "primary sporidia" copulation occurs at the base laterally, rarely at the summit. It appears that from these "primary sporidia" secondary ones may be produced directly, with or without a previous copulation. After the fall of the "sporidia," the basidia which supported them may give rise to delicate colorless threads. From the secondary sporidia tertiary ones may be produced and copulation occur between them. Or a sporidium may produce another sporidium on one side and on the other a growing tube. Not only two, but three or more primary sporidia may copulate and then may each produce secondary sporidia; or a single sporidium which has not copulated may produce even three successive generations of sporidia. Evidently if this copulation, so-called, has anything whatever to do with reproduction or specific perpetuity, it sits very lightly, so far as necessity is concerned.

In from 15 to 20 days after sowing the conidia of *Tuburcinia* upon the Trientalis leaf the charasteristic black spots appear. Observation has made it very clear that both wind and insects by carrying the conidia aid in infecting plants previously healthy. These conidia, after sending their tubes between the epidermic cells of the host, develop around their point of entry a mycelium mass, each for itself, which remains well divided from those produced by other conidia. This *Tuburcinia Trientalis* furnishes, not the *first*, but the *best* illustration of conidial production among the *Ustilagineæ*.

Tuburcinia has both its conidia and its sporidia on the same host plant, as *Entyloma* has also, but the author hazards the conjecture that other links will be found, comparable to those of the *Uredineæ*, which will fairly make out another example of heterœcism.

For want of space we pass by the experiments upon *Sorospori-*

um Saponariæ, Rudolph, and *Sorosporium Junci*, Rudolph, which are regarded as representing different genera, and accordingly the latter is named *Tolysporium Junci*. Plate IV, figures 1, 2, 3, 4 show the spore masses of this last and the mode of germination; figures 5, 6, 7, 8 reveal the mode of production of the sporidia, which occur in whorls on the thickish, jointed promycelium and copulate by their upper ends.

Thecaphora hyalina, Fingerh., though it has been named *Sorosporium hyalinum*, is distinguished from this genus by both spore structure and mode of growth. As the period of vitality of these spores is but brief, all culture experiments with them must be made with fresh specimens. Plate III, fig 19, shows the brownish-yellow spore balls made up of from 2 to 20 verrucose spores. A very characteristic mark of these is the clear, round spot through which the germinating endospore tube protrudes. It is very suggestive of the Uredospores. This is shown by figures 20–22. Figures 24–26 show, instead of normal sporidia such as are found in *Tolysporium* and most of the *Ustilagineæ*, a number of lateral non-septate branches produced upon the septate promycelium and those (the former) of the same promycelium copulate by their extremities, to accomplish which the lower bend upward and the upper downward, after which a long cell develops, becomes septate, and then accumulates all the protoplasm in its terminal segment.

Sorosporium Astragali and *S. Desmodii*, both of Peck, are regarded on spore evidence as belonging to the genus *Thecaphora*.

Figures 9 and 10 of Plate IV are devoted to formation of sporidia by *Entyloma Eryngii;* 12–18 to *E. Aschersonii;* and 19–26 to *E. Magnusii*. Of these the last two species are removed from their former place in *Sorosporium* and on spore data placed in *Entyloma*. Whilst copulation of sporidia in *Entyloma* is common, it does not occur in *E. Aschersonii*. Figures 27–35 of the same plate show *Melanotænium endogenum*, de Bary, which grows on *Galium Mollugo* and *G. verum*. It was formerly known as *Protomyces endogenus*, Unger, and *P. Galii*, Rabh. Here we find strong mycelium and haustoria, the latter of which sometimes take up one-third of the cell into which they enter. The spores are dark-brown, oval, and germinate by protrusion of the endospore and production of a promycelium, and show in their mode of growth a relationship to *Entyloma*, as de Bary had suggested. From the summit of this strong promycelium several oblong sporidia develop and these copulate by their apices, of course while still attached to the promycelium.

The following is an abstract of the *Ustilagineæ* as arranged in this paper:

I. No "sporidia" produced directly from the growing spore.

a. Spores produce many-celled tubes or threads, which remain either simple and unbranched, or whose terminal plasma-containing cell has several lateral, irregular, divided branches. The unbranched terminal joint can for a time live and grow if separated from the empty cells below.

1. SOROSPORIUM, Rudolphi.

S. Saponariæ, Rudolphi.

b. The threads from the spores produce a limited growth which develops into a promycelium; this instead of "sporidia" proper produces slender branches, which, growing toward each other, copulate by their ends. From this point of union another growth begins.

2 THECAPHORA, Fingerh.

T. hyalina, Fingerh.

II. The promycelium by transverse septa divides itself into several cells from each of which one or more "sporidia" are produced.

3. USTILAGO, Link. (Persoon, Tulasne.)

4. SCHIZONELLA, Schroeter (in Cohn's Beitr. z. Biol. d. Pfl. II Bd. p. 362.)

5. TOLYSPORIUM, mihi.

T. Junci. (Syn. Sorosporium Junci, Schr.)

III. The promycelium produces on its end a whorl of 2 to 8, usually spindle shaped branches ("sporidia") which by pairs usually copulate sidewise. With or sometimes without this copulation these "sporidia" produce either secondary "sporidia," or long, simple or branched thin mycelial threads.

6. TILLETIA, Tulasne.

7. ENTYLOMA, de Bary. To which genus as before understood the two species *E. Aschersonii* and *E. Magnusii* are added.

8. MELANOTÆNIUM, de Bary.

M. endogenum, de Bary. This may yet be united with *Entyloma*.

9. SCHROETERIA, Winter.

Schr. Delastrina, Winter. (Syn. Geminella Delastrina. Schroeter.)

10. UROCYSTIS, Rabenhorst. Of this genus the mode of growth of but four species has been observed, i. e. *U. occulta*. Rab., *U. pompholygodes*, Rab., *U. Violæ*, F. v. Wald., and *U. primulicola*, P. Magnus. *U. Corydalis*, Niessl., (in Thuemen Mycoth. 1626) is more nearly related to *Entyloma* as here understood, but is very different from *Entyloma Corydalis*, de Bary.

11. TUBURCINIA, Fries.

T. Trientalis, Berkeley and Broome.

IV. Mode of growth unknown. Here however are placed all the species of *Sorosporium*, Rudolph, and *Thecaphora*, Fingerh., whose mode of growth has not been certainly shown; and also the genus

12. VOSSIA, Thuemen.

V. Molinæ, Thuem. (Winter had placed this under *Tilletia*.)

J. T. ROTHROCK.

Respiration of Plants.—We were once taught that one of the essential differences between animals and plants is that the former exhale carbonic acid and inhale oxygen, while in the latter the process is reversed. So long as chlorophyll-bearing plants alone were studied this view was to a certain extent excusable, for the more abundant effects of assimilation obscured the comparatively small effects of respiration. But modern investigation has come to a knowledge of the fact that the activities of every living cell, whether plant or animal, are similar, and that oxygen starvation is just as certain destruction for a plant cell as for an animal cell. The food used and the excretory products are in both cases the same. In regard to chlorophyll-bearing plants then the additional statement can be made that some plants differ from most animals and all other plants in being able to make their own food.

Now this using of food, called respiration, and common to all life, demands the presence of oxygen, and the question has arisen with regard to plants whether this oxygen is derived directly from the free oxygen of the air or is a secondary product resulting from intramolecular decompositions. It has been observed that germinating plants will continue to evolve carbonic acid in an atmosphere of nitrogen or hydrogen, or in a vacuum. Wortmann, observing that the amount of carbonic acid evolved from germinating plants was the same when placed in air or in a vacuum, proposed the theory "that all the carbonic acid produced in plant respiration has its origin in intramolecular decompositions; or, in other words, that the free oxygen of the air takes no direct part in the formation of the carbonic acid in respiration." Dr. W. P. Wilson, an American student at Tubingen, Wurtemberg, has been experimenting upon this subject, and in the *Am. Jour. of Science* for June he gives a condensed abstract of some of his results, which will later be published in full. His experiments show that Wortmann's theory falls to the ground because it is founded upon a fallacy. That there is an intramolecular respiration as differing from a normal is easily proved, but that the amount of carbonic acid given off by the former equals that given off by the latter is untrue, for Dr. Wilson's experiments showed, in every case but one, a rapid diminution in the evolution of carbonic acid when he substituted an atmosphere of hydrogen for air. Hence the conclusion is irresistible that the carbonic acid excreted in plant-respiration is a partial product of direct oxidation from the free oxygen of the air. W. Pfeffer shows that even if Wortmann's experiments had been verified his theory would still fail, because "if an equal amount of carbonic acid were formed in both intramolecular and normal respiration this would only prove that the same number of carbon affinities for oxygen had been satisfied in each case, but would in no way indicate from whence the supply of oxygen came. And in case free oxygen was active in normal respiration, still in intramolecular, when free oxygen was absent, the full supply might yet be obtained through constant powerful attractive forces which could take oxygen from other combinations and in this way give rise to secondary changes." Dr. Wilson's experiments also verify what has previously been taught with regard to respiration, viz., that the presence of light does not in any appreciable degree directly affect the amount of carbonic acid given off, a capital point to use in contrasting respiration and assimilation.—J. M. C.

Notes from Northern Iowa.—*Psoralea esculenta*, Pursh, grows on dry knolls, but rarely matures fruit. This plant, the *Pomme de Prairie* of the voyageurs, has large, starchy roots which are quite palatable to a botanist made hungry by a long tramp. *P. argophylla*, Pursh, is much more common than the former, preferring lower grounds. I have not, after three seasons search, been able to find a single mature seed. It must, however, fruit in favorable years.

Polygonum Hartwrightii, Gray, is common in bogs. It has flowered here but once in four years—the summer of 1880—and I was then so fortunate as to secure a good supply of specimens. None of the plants matured fruit.

Helianthus Maximiliani, Schrad., is very common on the prairies throughout this county. In grain fields it grows much larger, and is almost as troublesome as *H. rigidus*, L. This locality, I believe, is the farthest north from which this species has been reported.

Lespedeza leptostachya, Eng., is common on prairies.

Lophanthus anisatus, Benth., is found in woods near Estherville.

The peculiar *Lygodesmia juncea*, Don., I have found in a few localities. It chooses the driest knolls, where it seems to lead a precarious existence, so much so that I fear it will soon leave us entirely.

Liatris punctata, Hook., produces a large number of stems from the same root; the outer ones generally being nearly prostrate. It is only found on the driest knolls.

Iva xanthiifolia, Nutt., has been introduced from the northwest by cattle, and is becoming troublesome in some places. The plant is an annual, and makes a very rapid growth, the main stem often being over an inch in diameter, hollow, and very hard.

Calamagrostis stricta, Trin., occurs on wet prairies, a few culms only in a place.

Bouteloua oligostachya, Torr., grows on dry, sandy ridges, along with *Carex siccata*, Dew., *Œnothera serrulata*, Nutt, and *Castilleia sessiliflora*, Pursh.

In June, 1880, *Senecio palustris*, Hook., made its appearance along the margin of one of our lakes, and also in wet ground near the state line of Minnesota. The larger plants, with hollow stems over an inch in diameter, grew about three feet high, and bore such a profusion of golden yellow blossoms that it was impossible to press a whole plant in a specimen. Last season not a single specimen could be found, which makes me fear that it did not come to stay.

Last season while searching along the margin of a small lake in the eastern part of this county, I came across a *Potamogeton*, bearing an abundance of large floating leaves. I sent it to Rev. Thomas Morong, of Ashland, Mass., who determined it to be *P. Illinoensis*, described and named by him in the Bot. Gaz., Vol. V, page 50. It was first discovered by Mr. H. N. Patterson near Oquawka, Ills., the only other locality known.

In a large bog, three miles from my home, I have found, within a radius of five rods, *Salix myrtilloides*, L., *Scheuchzeria palustris*, L., *Potentilla palustris*, Scop., *Triglochin maritimum*, L., var. *elatum*, Gr., *Eriophorum gracile*, Koch., var. *paucinervium*, Eng., and *Carex chordorhiza*, Ehrh.—R. J. Cratty, *Estherville, Emmet Co., Iowa.*

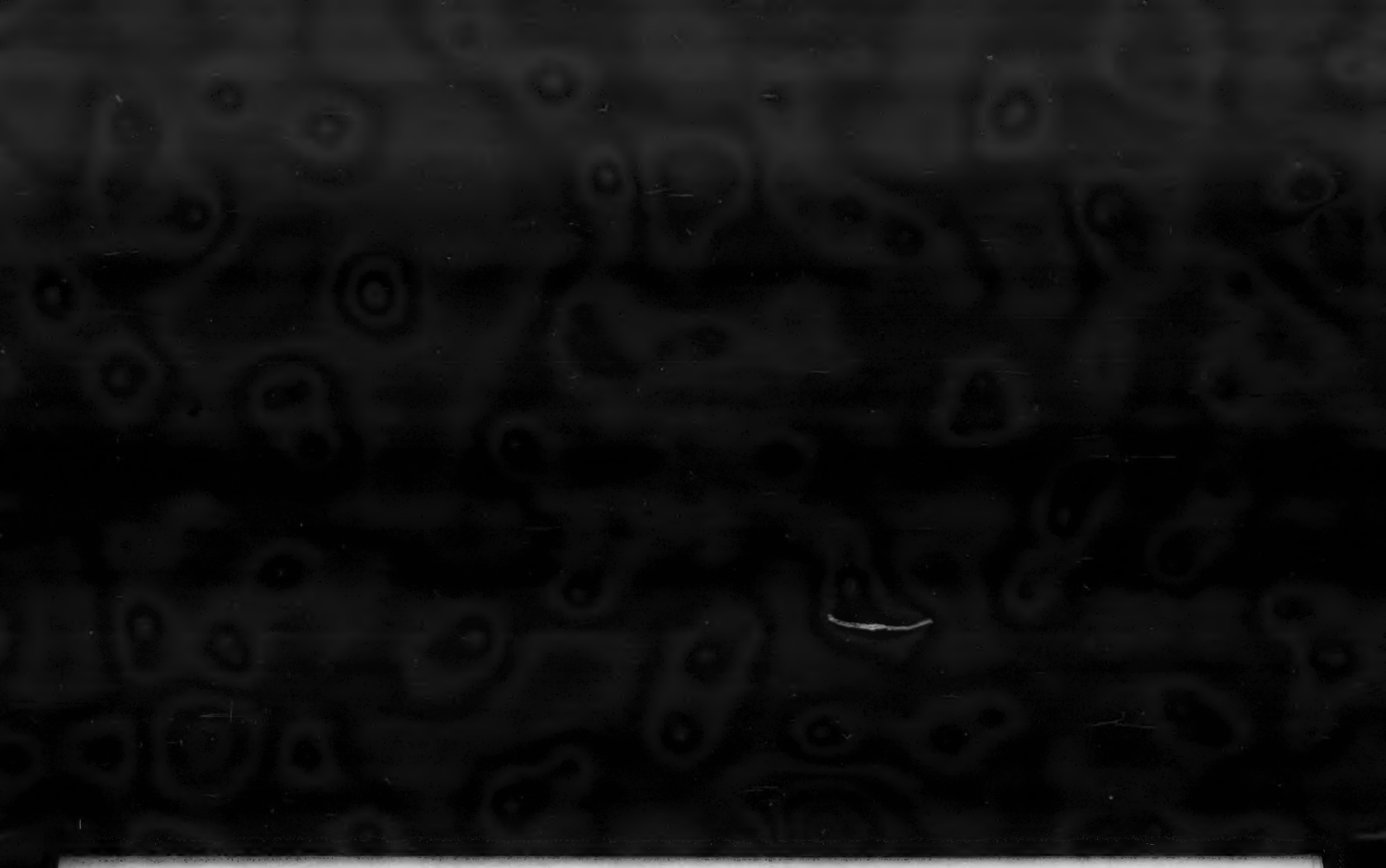
Osmunda cinnamomea, L., var. frondosa, Gray.—I have had growing in my yard for a number of years (brought originally from Pennsylvania) a fine clump of *Osmunda cinnamo-*

mea, and have admired it for its graceful habit. The sterile fronds gently curve backward so that the fertile fronds always stand erect in the center of the urn-shaped growth. There has been no change for ten years in the manner of development till the present season. Now two of the fertile fronds are partly sterile; in one the tip of the frond, for 13 pairs of pinnæ, is fertile, then two pairs partly fertile, the remaining 5 pairs not being distinguishable from the entirely sterile fronds; the other has the tip and base sterile, and 3 pairs of pinnæ out of the central portion fertile, and one pair partly fertile. Although the change from the fertile frond towards the sterile has taken place from the base towards the tip, in the pinnæ that are partly fertile the change is in the reverse order, that is from the tip towards the base. Usually after the discharge of the spores the fertile fronds wither and finally disappear, but in this case they have not withered, as have the other fertile fronds, but mantain their normal upright habit instead of curving backward.—ISAAC C. MARTINDALE, *Camden, N. J.*

The Action of Acids on Cellulose and Starch-grains.—In the BOTANICAL GAZETTE for May a discrepancy is shown between a statement made in Sachs' Text-book of Botany and some facts found by experiment, and an explanation is asked. It refers to the action of acids on cellulose. In the fourth revised edition of Sachs' Lehrbuch der Botanik (Leipzig, 1874.) this discrepancy does not exist. The translation by Bennett and Dyer was based on the third edition, and it is probable some change was made by the author in the later work. But not possessing the translation nor any edition earlier than the fourth, I cannot compare them. The accuracy of the translation may be assumed from the competency of those who made it. The same subject is evidently treated in the fourth edition, page 640, where a paragraph is found referring to the action of acids on cellulose and starch-grains, and a figure of those of *Hoya carnosa* under the influence of this treatment is inserted. A translation of the passage is given below. It will be seen that the per cent. of dilution is not stated, but is presumably somewhere near that found necessary by the experiments in Purdue University. It is with the second mode of treatment that the violent action is said to occur. The first adjective might be rendered "violent," but hardly means this when compared with the second, where the primary meaning is violent.

"Acids (especially sulphuric), greatly diluted with water, cause a stronger swelling (eine starkere Quellung) of starch-grains and cellulose than pure water, without however destroying their organization. After the acid is removed by washing they return to their former condition. But at a higher concentration (bei hoeherer Concentration) the acid produces a violent swelling (eine heftige Quellung) of starch-grains and cellulose; they are changed into a pasty state: the protoplasm coagulates just as it does at a higher temperature. Concentrated sulphuric acid finally destroys their molecular structure completely, causing a chemical change of substance; they are liquefied."—E. J. HILL, *Englewood, Ill.*

Prolonged Vitality of Seeds.—An interesting case of the germination of seeds of the wild crab-apple (*Pirus coronaria*) after lying dormant twenty-three years recently came to my notice. In 1859 Dr. J. W. Smith of this place built a frame barn about thirty feet from his dwelling, the foundation of which was a low wall of limestone laid upon the garden soil. In April of the present year the barn was removed, and twenty days afterward the foundation also. As the Doctor pried up a bottom stone about twenty inches across, two small plants respectively an inch and an inch and a half high straightened themselves into an erect position. They were near the center of the stone and some three inches apart. A number of persons carefully examined them besides the Doctor. There seems to be no doubt that the seeds had been protected by the building for this long period, and that when it was removed sufficient warmth and moisture had penetrated beneath the foundation wall to cause them to grow.—J. C. ARTHUR. *Charles City, Iowa.*

Curious Growth on Gleditschia triacanthos.—Prof. F. L. Harvey, of the Arkansas Industrial University, sends the accompanying figure to illustrate a growth on our honey locust in which

he points out a strong resemblance to an animal standing erect upon thorns, and bearing an armed snout. He mentions two small prominences standing in position and of a nature to represent eyes. The narrowed end was the point of attachment to the tree. There are nine thorns on the front side (two are not shown, being behind a large thorn) and ten on the reverse, only four being shown in part. This monstrosity is curious and of course interesting enough to be recorded.